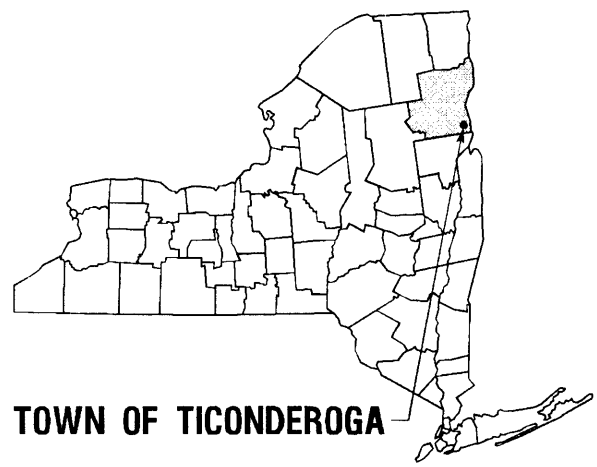
FLOOD INSURANCE STUDY

TOWN OF TICONDEROGA, NEW YORK
ESSEX COUNTY



REVISED:
SEPTEMBER 6, 1996

Federal Emergency Management Agency

COMMUNITY NUMBER - 361159

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial FIS Effective Date: May 17, 1988

Revised FIS Dates: September 6, 1996

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FLOOD INSURANCE STUDY
TOWN OF TICONDEROGA, ESSEX COUNTY, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates a previous FIS/Flood Insurance Rate Map (FIRM) for the Town of Ticonderoga, Essex County, New York, and supersedes the FIRM for the disincorporated Village of Ticonderoga. This information will be used by the Town of Ticonderoga to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

For the original May 17, 1988, FIS (hereinafter referred to as the 1988 FIS), the hydrologic and hydraulic analyses were taken from the September 28, 1979, FIS for the Town of Plattsburgh, prepared by Camp Dresser & McKee, Environmental Engineers, for the Federal Emergency Management Agency (FEMA) under Contract No. H-3832 (Reference 1).

For this revision, the hydrologic analyses were prepared by Leonard Jackson Associates for FEMA under Contract No. EMW-93-C-4145. This work was completed in August 1994.

1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study.

For 1988 FIS, the results of the study were reviewed at a final CCO meeting attended by representatives of FEMA and the Town of Ticonderoga on June 3, 1987.

For this revision, the following agencies were contacted for the purpose of acquiring information: FEMA, the New York Department of Environmental Conservation, and the Lake George Commission.

The community was notified by FEMA in a December 19, 1994, letter of the incorporation of the Leonard Jackson Associates hydrologic analyses into its FIS.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the incorporated area of the Town of Ticonderoga, Essex County, New York. The Village of Ticonderoga has disincorporated and its area is now shown on the Town of Ticonderoga FIS. The area of study is shown on the Vicinity Map (Figure 1).

For the 1988 FIS, the entire shoreline of Lake Champlain within the corporate limits was studied by detailed methods based on a lake level frequency analysis performed in 1976. For this revision, the entire shoreline of Lake George within the corporate limits was studied by detailed methods.

Limits of detailed study are indicated on the FIRM (Exhibit 1). The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

All or portions of Eagle Lake, Penfield Pond, Putnam Creek, Trout Brook, Haymeadow Brook, Ticonderoga Creek, and several unnamed tributaries were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or limited flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Town of Ticonderoga.

2.2 Community Description

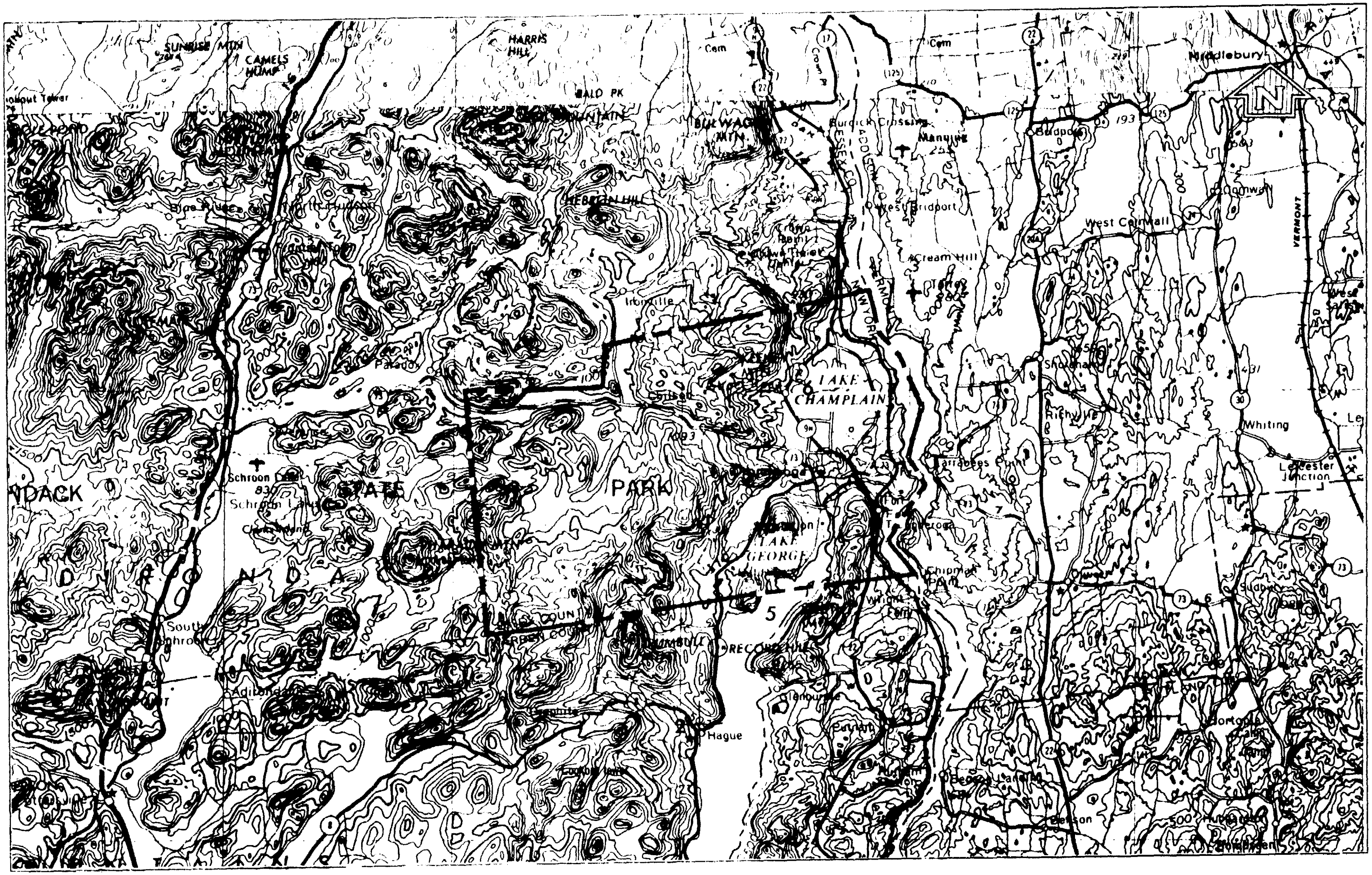
The Town of Ticonderoga is located in southeastern Essex County, approximately 120 miles north of New York City. It is bordered by the Town of Crown Point to the north, the Town of Schroon to the west, the Towns of Hague and Putnam to the south, and Lake Champlain and the Towns of Shoreham and Orwell, Vermont, to the east.

Lake Champlain is a glacial lake with a north-south orientation, forming the border between New York and Vermont. Its total length is over 100 miles. At its widest part, between Plattsburgh, New York, and Burlington, Vermont, the lake is approximately 22 miles wide. At the Canadian border, where the lake empties into the Richelieu River, its drainage area is 8,277 miles.

The mean minimum temperature in the area in January is 9 degrees Fahrenheit (°F), and the mean maximum temperature in July is 83°F. The mean annual precipitation is approximately 30 water-equivalent inches; the mean seasonal snowfall is approximately 60 inches (Reference 2).

2.3 Principal Flood Problems

High-water levels on Lake Champlain result from a complex combination of climatic conditions that characterize the winter



APPROXIMATE SCALE

4 0 4 8 12 MILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF TICONDEROGA,NY

(ESSEX CO.)

VICINITY MAP

FIGURE 1

period throughout its drainage area. The conditions most conducive to flooding along the lake shore are freezing temperatures and a large quantity of snowfall throughout the winter, followed by a sudden period of warm and rainy weather without a refreeze. Such a combination has occurred in varying intensities in the past and has resulted in flood damages along the shore. To aggravate this flooding, the ice sheet on the lake's surface has been so thick at times that it did not readily melt with the onset of warm weather. The result has been that the large volume of water in the lake has lifted the ice, and strong winds have forced it ashore, crushing lake front structures in its path. It is estimated that ice can exert a force of up to 30,000 pounds per square inch, enough to pulverize a concrete wall (Reference 3).

On May 4, 1869, Lake Champlain was at its highest level in the last 150 years at 102.1 feet. In April 1903, the lake stage reached an elevation of 101.8 feet. In March 1936 and April 1976, it reached elevations of 101.61 and 101.64 feet, respectively.

2.4 Flood Protection Measures

No flood protection structures currently exist in the Town of Ticonderoga.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this FIS. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for the flooding sources studied in detail affecting the community.

In 1988 FIS, the hydrologic information for Lake Champlain was based on an analysis completed in 1976, which was taken from the FIS for the Town of Plattsburgh (Reference 1). The U.S. Geological Survey (USGS) measures lake stages at two gaging stations on the northern end of Lake Champlain: No. 04294500 at Burlington, Vermont; and No. 04295000 at Rouses Point, New York. The data from the Rouses Point gage were used for this analysis because it is on the western shore of Lake Champlain, because its period of record (1871 to present) is longer than that of the Burlington gage, and because examination of the records of these gages shows that the lake stages at both locations are very similar.

Graphical frequency analysis was chosen as the method most likely to determine lake stages of the selected recurrence intervals with a reasonable degree of accuracy. The results of this analysis were plotted on an arithmetic-probability graph (rather than a logarithmic-probability graph), which allows data points to vary over a wider range. This flexibility would help to describe a stage-frequency curve more accurately and would reduce the human error introduced in fitting a curve through the plotted points. It was decided not to employ the log-Pearson Type III frequency analysis because the range of logarithms of the lake stage data is too narrow to yield reliable results.

Three graphical frequency analyses were applied to the data measured at the Rouses Point gage from 1871 to 1976. They were the Weibull and Hazen Formulas, and the Beard Method (Reference 4 and 5). The stages for Lake Champlain presented in this report were obtained from the stage-frequency curve produced by the Beard Method because this curve appears to be an average of the curves produced by the other two formulas.

In this revision, the 100-year stillwater elevation for Lake George was determined as described below. The elevation of Lake George, which has a drainage area of 233 square miles, is regulated by flood gates at the Town of Ticonderoga. Daily lake levels from September 1, 1913, to September 30, 1990, were obtained from the USGS gaging station at Roger's Rock. The maximum gage height observed was 5.1 feet on April 9, 1936. The 100-year frequency flood level of 5.2 feet was then obtained using a log-Pearson analysis. The datum of the gage at Roger's Rock is 315.9 feet; thus, Lake George, for its entire shoreline within the community, has a 100-year frequency flood elevation of 321.1 feet (Reference 6). All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

A summary of peak elevation-frequency relationships for Lake Champlain and Lake George is shown in Table 1, "Summary of Stillwater Elevations."

TABLE 1 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet NGVD) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LAKE CHAMPLAIN Entire shoreline within community	101.01	101.76	101.97	102.32
LAKE GEORGE Entire shoreline within community	*	*	321.10	*

* Data not available

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS generally provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For Lake Champlain, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 7). For Lake George, the floodplains were delineated on U.S. Geological Survey topographic mapping with a contour interval of 20 feet and at a scale of 1:62,500 enlarged to 1:12,000 (Reference 8).

For the flooding sources studied by approximate methods, the boundary of the 100-year flood was delineated using the Flood Hazard Boundary Map for the Town of Ticonderoga (Reference 9).

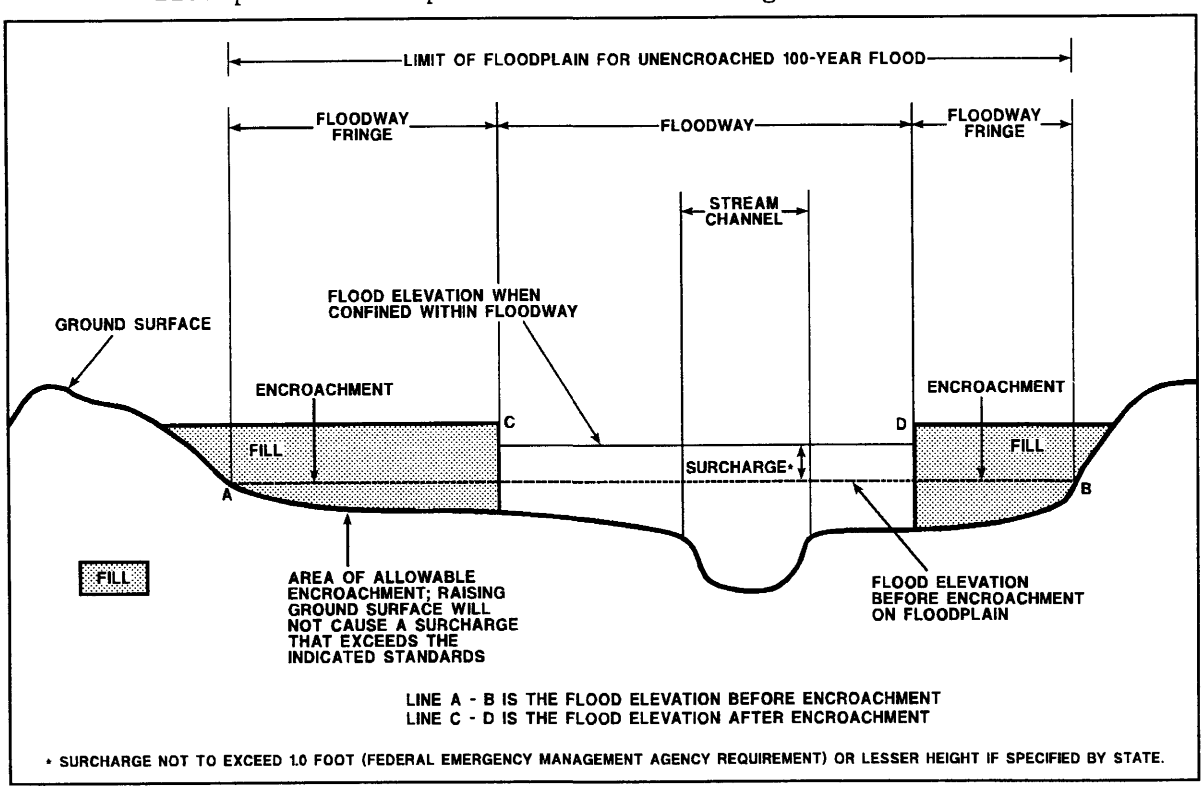
The 100- and 500-year floodplain boundaries are shown on the FIRM (Exhibit 1). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the FIRM (Exhibit 1).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. Floodways are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.



FLOODWAY SCHEMATIC Figure 2

The floodway concept is not applicable to lacustrine flooding; therefore, no floodways are shown in this FIS.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

FISs have been prepared for the Towns of Crown Point, Hague, Orwell, Putnam, Schroon, and Shoreham (References 10, 11, 12, 13, 14, and 15).

Because it is based on more up-to-date analyses, this FIS supersedes the previously printed FIS for the Town of Ticonderoga (Reference 16). This FIS also supersedes the previously printed FIRM for the disincorporated Village of Ticonderoga (Reference 17).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this FIS can be obtained by contacting FEMA, Mitigation Division, 26 Federal Plaza, Room 1351, New York, New York 10278.

9.0 BIBLIOGRAPHY AND REFERENCES

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